REMARKS

This Amendment, submitted in response to the Office Action dated August 20, 2004, is believed to be fully responsive to each point of rejection raised therein. Accordingly, favorable reconsideration on the merits is respectfully requested.

Claims 1-30 are pending in the present application. Claims 4-6, 8-10, 14-16 and 18-20 have been objected to but would be allowed if rewritten in independent form.

I. Double Patenting

Claims 1 and 2 have been rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of Hara (U.S. Patent No. 6,173,086; hereinafter "'086 patent").

Applicant respectfully submits that the obviousness-type double patenting rejection is improper. Contrary to the Examiner's assertion, claims 1 and 2 do not merely cover equivalent subject matter and are not merely a broader recitation of claim 1 of the '086 patent.

A rejection under non-statutory obviousness-type double patenting is based on the language of the claims. To determine if obviousness-type double patenting applies, a determination must be made as to the difference in scope and content between the patent claim language and the prior art. In addition, a determination must be made regarding the obviousness of the claim to one of ordinary skill in the art. An obviousness-type double patenting rejection is proper only if a claim in the application is merely an obvious variation of an invention claimed in the patent. MPEP 804(II)(B)(1).

Claim 1 recites "reducing a transformed image signal of said transformed image signals which has a desired frequency range containing a spatial frequency component corresponding to at least a frequency of said periodic pattern **in only the vicinity of an array direction** of said periodic pattern." The Examiner asserts that Hara's claim 1 recites that the frequency components of the image signal which correspond to the periodic structure pattern are reduced. Further, the Examiner reasons that in the process of reducing the image signals that correspond to the periodic structure pattern, that the image signals which are in only the vicinity of an array direction of the periodic pattern are reduced since the image signals of the periodic pattern that are reduced are inherently in the array direction of the periodic pattern.

However, Applicant submits that there is no indication that a periodic pattern in **only a vicinity of an array direction** of a transformed image signal is reduced. In Hara, it appears that a periodic pattern of the entire image signal would be reduced and the reduction of a periodic pattern is not merely limited to a vicinity of an array direction, as recited in claim 1. In particular, Hara discloses two-dimensional transforms.

The Examiner appears to agree that if Hara teaches a stripe type grid, then the transformation of the image does not occur in only the array direction in the event of the disclosed two-dimensional transform. Detailed Action, page 3, lines 12-16. Claim 1 of Hara only describes a stationary grid which is a stripe form (Fig. 2, element 2). The two dimensional transform in Hara does not make obvious the transformed performed in the present claim 1. Other periodic patterns disclosed in the specification of Hara relate to a photograph of wire

netting. However, disclosures in the specification are not pertinent to a double-patenting rejection, which must be based on previously claimed subject matter.

Moreover, Hara appears to suffer from the deficiency in the prior art described on pages 38-39 of the specification, which an exemplary embodiment of the present invention, as recited in claim 1 (reducing a transformed image signal in only the vicinity of an array direction), is meant to cure. In the prior art, a filter filters high and low frequency components and zeros high frequency components in horizontal and diagonal directions. This results in high frequency components corresponding to desired image portions becoming being removed and reduced. As recited in claim 1 of the '086 patent, sub-sampling is performed to obtain a reduced image is performed without reference to grid array direction. Therefore, it appears that Hara suffers from the deficiencies in the prior art which are cured by exemplary embodiments of the present invention.

Therefore, it would be apparent to one of ordinary skill in the art that claim 1 of the present invention is patentably distinct from claim 1 of the '086 patent.

Further, Hara discloses a method for obtaining a reduced size image in which the frequency components corresponding to the periodical structure patterns of a stationary grid are suppressed. In contrast, an exemplary embodiment of the present invention is a method for obtaining an image, which has the same size as an original image, with periodic patterns in the original image suppressed. Therefore, the reduced size image, obtained in Hara, is different in size from the image obtained in the present invention.

Moreover, the step of performing a wavelet transform, recited in claim 1 of Hara, corresponds to only the transforming step (first step), recited in claims 1 and 2 of the present application, respectively. Therefore, Hara does not disclose the reducing and inverse-transforming step (second step), recited in claims 1 and 2 of the present application, respectively. Hara merely utilizes the image, which is obtained from the wavelet transform (first step), as the reduced size image, and it is not necessary to perform the inverse-wavelet transform (second step) to obtain an image which has the same size with the original image.

For at least the above reasons, claim 1 and its dependent claims should be deemed allowable. Since claim 2 recites similar elements, it should be deemed allowable for the same reasons.

II. Claim Objections

The Examiner has objected claims 23 and 26 for informalities. The claims have been amended as indicated above. Consequently, the objection to claims 23 and 26 should be withdrawn.

The Examiner also objects to claims 24-26 asserting that claims 24-26 appear to recite the same features as claims 21-23 respectively. Applicant has amended claims 24-26 as set forth above. Applicant submits that the recitations are analogous to that previously pending before the Examiner and therefore raise no new issues. The amendments also reduce the number of issues on appeal.

III. Claim Rejections under 35 U.S.C. § 112, First Paragraph for Failing to Comply with the Written Description Requirement and the Enablement Requirement

Claims 7, 17, 21, 24, 27 and 28 have been rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement and the enablement requirement.

With respect to claims 7 and 17, the Examiner states that there is no support in the specification for the language "and then performs inverse wavelet transformation, with respect to a signal of said transformed image signals which contains a spatial frequency component corresponding to a grid array frequency of each possible stationary grid that may be used." Support for this aspect of claims 7 and 17 can be found on for example, page 11, first two full paragraphs and page 7.

With respect to claim 21, the Examiner asserts that there is no support in the specification for the language "reducing a transformed image signal of said transformed image signals which has a desired frequency range containing a spatial frequency component corresponding to at least a grid array frequency of said stationary grid [having specified high and low end range]..." Support for this aspect of the claim can be found at for example, page 6, first full paragraph for a high end. At the low end, Applicant submits that one skilled in the art would understand from the characteristics relative to the stationary grid and orientation thereof that limitations on low end components are necessarily also contemplated. Verbatim support is not required.

Consequently, Applicant respectfully requests that the Examiner withdraw the rejection of claims 7, 17 and 21 under § 112, first paragraph since support for the claims can be found within the specification and the respective cited pages and paragraphs enable the claimed recitations.

The Examiner states that the "wherein frequency components greater than the high end range are not suppressed and lower than the low end range are not suppressed by filtering" language of claim 21 will not be considered. However, the Examiner has provided no reasoning as to why this aspect of the claim will not be given consideration. Since the wherein language of the claim further describes the method of claim 21, Applicant respectfully requests that the Examiner give this aspect of the claim due consideration. Further, support for this aspect of claim 21 can be found on for example, page 6, first full paragraph.

IV. Claim Rejections under 35 U.S.C. § 112, Second Paragraph as Being Indefinite

Claims 7, 17 and 24-26 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claims 7 and 17, the Examiner asserts that the transformed image signals contain a spatial frequency component corresponding to a grid array frequency of a single stationary grid (the one that is used). Therefore, the Examiner reasons that there is no antecedent support for the transformed image signals which contain a spatial frequency component

corresponding to a grid array frequency of each possible station grid that may be used. Applicant submits that there are no antecedent issues with respect to claims 7 and 17 since the stationary grid can have any of many possible spacings.

As described on page 7, lines 7-13 in the specification of the present application, stationary grids, which are used in an ordinary photography apparatus, extend in a plurality of directions, such as a horizontal direction and vertical scanning direction, or a main-scanning direction and sub-scanning direction. Therefore, there are no antecedent issues regarding Claims 7 and 17.

Claims 24-26 are proposed to be amended, consequently, the § 112, second paragraph rejection of claims 24-26 is now moot.

V. Claim Rejections under 35 U.S.C. § 102

Claims 1, 2, 11 and 12 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Yazici et al. (U.S. Patent No. 6,333,990).

In response to Applicant's argument that in isolating a periodic pattern in Yazici, the grid pattern frequency is not the only frequency range subject to suppression, the Examiner asserts that only the grid pattern frequency 380 of the transformed image is subject to suppression, citing Figs. 7 and 8 in support.

In Fig. 7, the frequency component of the grid line artifact 380 is distinguished from components of the image because it has the highest spectral component of high frequency components. Grid line spectral component 380 is adjusted so that component 380 is no longer

greater in magnitude that the average adjacent magnitude. However, there is no indication that only grid line spectral component 380 is subject to compression. For example, high intensity regions of the x-ray image are also removed before processing to facilitate removal of grid line artifacts. See col. 3, lines 44-48. Moreover, not only line 380 is removed but all components in range 388 become transformed in a manner that raises the scenario that medically significant information becomes altered. Consequently, Yazici does not disclose reducing a transformed image signal in only the vicinity of an array direction of said periodic pattern.

Further, Yazici does not disclose whether processing for reducing grid-line artifacts is performed in a direction other than the array direction.

Therefore, claims 1 and 2 and their dependent claims should be deemed patentable.

VI. Claim Rejections under 35 U.S.C. § 102

Claims 1, 2, 11, 12 and 21-23 have rejected under 35 U.S.C. § 102(e) as being anticipated by Hara (U.S. Patent No. 6,173,086).

In response to Applicant's arguments that Hara does not disclose transform "only in the vicinity of a grid array direction" as recited in claim 1, the Examiner states that stationary grids are ordinarily utilized in the imaging processes and that stationary grids occur in two dimensions. Further, the Examiner states that since the filtering is done is two dimensions, the transformed image signals in only the vicinity of an array direction of the periodic pattern would be reduced.

The Examiner relies on a general photograph taken through wire netting to support the rejection. However, the netting need not have an orientation consistent with a grid pattern. In

spite of any two dimension patterns discussed by Hara, the feature relative to directions and vicinity of a grid are not inherent. Claims 22 and 23 describe the orientation more particularly.

Furthermore, it appears, from page 3, lines 5-19 (particularly, lines 15-19) in the Detailed Action, that the Examiner misread the descriptions on col. 7, lines 5-7 of Hara, namely, "the frequencies of 3.4 cycles/mm and 4.0 cycles/mm are the frequencies corresponding to stationary grids, which are utilized ordinarily". The Examiner appears to have interpreted that ordinarily, both stationary grids with frequency 3.4 cycles/mm and 4.0 cycles/mm are simultaneously used even during obtainment of a single image. As described on col. 1, line 50-54 in Hara, "a technique is often employed wherein a stationary grid having a predetermined grid pitch is located." Therefore, only one stationary grid is utilized during obtainment of a single image in Hara. Hence, Hara does not disclose two-dimensional suppression processing for two-dimensional stationary grids, but discloses two-dimensional suppression processing for a one-dimensional stationary grid.

For at least the above reasons, claims 1, 2, 11, 12 and 21-23 should be deemed allowable.

VII. Supplemental Arguments with respect to Hara and Yazici References

Applicant submits that the range of suppression processing is different between the present invention and the cited references (Hara and Yazici et al.) based on the descriptions in the specification of the present application at page 38, line 23 through page 40, line 26 and the diagram at the bottom of Fig. 13 of the present application.

Figures 1-3 in the attached Appendix illustrate spatial frequency characteristics in a Fourier space during suppression processing of the present invention, Hara and Yazici. Figure 1 corresponds to an exemplary embodiment of the present invention, Figure 2 corresponds with Hara, and Figure 3 corresponds with Yazici. In each of Figures 1-3, a region including reduced components is illustrated as a shaded area. Further, in Figures 1-3, the periodic patterns are arranged in the direction of a v-axis.

Figure 1

Figure 1 illustrates a result of reduction processing consistent with an exemplary embodiment of the present invention. Image signals which (1) have a desired frequency range containing a spatial frequency component corresponding to at least a frequency of said periodic pattern and (2) are in only the vicinity of an array direction of said periodic pattern both of the following conditions, are reduced in the present invention.

Figure 2

Figure 2 illustrates a result of reduction processing according to Hara. The reduced size image is produced by performing low-pass filtering processing in two directions in two-dimensional wavelet transformation. The reduced image in Hara includes only low frequency components in both directions. Therefore, all image signals that have a desired frequency range containing a spatial frequency component corresponding to at least a frequency of said periodic pattern are reduced. Since image signals, which are not in the vicinity of the array direction of the periodic pattern, are also reduced, a high frequency component, which is not desired to be

suppressed, such as a horizontal pattern, a diagonal pattern, etc, in the original image, is suppressed as well as a vertical pattern, which is desired to be suppressed.

Figure 3

Figure 3 illustrates a result of reduction processing according to Yazici. The reduced image is produced by reducing image signals. However, frequencies in the direction of a u-axis, which is perpendicular to the array direction (v-axis), are not considered. Therefore, the reduction processing in Yazici is not a process for suppressing image signals, which satisfy both conditions of the claimed invention. The range of suppression processing illustrated in Figure 3 is only slightly narrower than the range of suppression processing illustrated in Figure 2. Generally, the frequency of the periodic patterns, such as stationary grids, is very low with respect to the direction of the u-axis. Therefore, only components in the vicinity of the array direction should be suppressed to remove the periodic patterns. Since components in a substantial frequency range with respect to the direction of the u-axis are suppressed in Yazici, medically significant information, which has a substantial value with respect to the direction of the u-axis, is also suppressed.

As described above, components of image signals, which are not reduced in the present invention, are reduced in Hara and Yazici.

VIII. Claim Rejections under 35 U.S.C. § 103

Claims 3 and 13 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Hara.

Claims 3 and 13 should be deemed patentable for at least the reasons set forth above with respect to claims 3 and 12.

Further, as discussed above, Hara merely utilizes the image which is obtained from the wavelet transform, as the reduced size image. Although the Examiner has cited Hara's descriptions on col. 6, line 66-col. 7, line 15, Figure 3, and col. 6, lines 22 - 27 in the Detailed Action, these descriptions correspond to the reducing step of the present invention. Particularly, Hara's description at col. 6, lines 22-27 correspond to the description regarding the signals HHl and HL1, which are obtained by wavelet transform, at page 26, line 16 to page 27, line 20 and Figure 8 and 7 in the present application. That is, Hara only discloses the transforming step in the present invention and does not disclose the reducing step.

Further, even if inverse-wavelet transform is performed to obtain the original size image from the LL, LH, HL, and HH image signals in Hara, the obtained image may contain the grid components, because the grid components in none of the LH, HL, or HH image signals are suppressed. Also, Hara does not teach or suggest that the high pass filter 11, 13, or 15 has a characteristic of suppressing the frequency corresponding to the stationary grid.

Furthermore, in Hara, when a reduced size image is produced by performing wavelet transformation on an original image, stationary grid components are reduced. However, in the present invention, the frequency components of the stationary grids are reduced by the reduction processing after wavelet transformation. Then, inverse-wavelet transformation is performed on the reduced image to produce an image, which has the same size as the original image, and in

which periodic patterns of stationary grids are suppressed. Therefore, the purpose of processing is different between Hara and the present invention. In other words, the sizes of generated images are different between Hara and the present invention. Further, since Hara only needs to produce a reduced size image, in which stationary grid components are suppressed, it is not necessary to perform inverse-wavelet transformation in Hara. In other words, the purpose of processing is fulfilled in Hara when the reduced size image is produced. Therefore, even if one skilled in the art may use the wavelet transformation and the inverse-wavelet transformation in combination, there is no motivation to perform the inverse-wavelet transformation after the production of the reduced size image in Hara. Hence, the present invention would not have been obvious in view of Hara.

IX. Claim Rejections under 35 U.S.C. § 103

Claims 29 and 30 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Hara and Barski et al. (U.S. Patent No. 6,269,176).

Claims 29 and 30 should be deemed patentable by virtue of their dependency to claims 2 and 12 for the reasons set forth above. Moreover, Barski does not cure the deficiencies of Hara.

X. Allowable Subject Matter

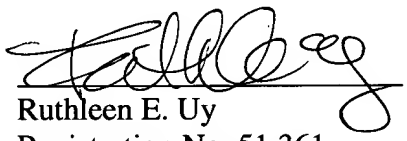
The Examiner has indicated that claims 4-6, 8-10, 14-16 and 18-20 contain allowable subject matter and would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

XI. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



Ruthleen E. Uy
Registration No. 51,361

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE
23373
CUSTOMER NUMBER

Date: February 14, 2005

Appendix

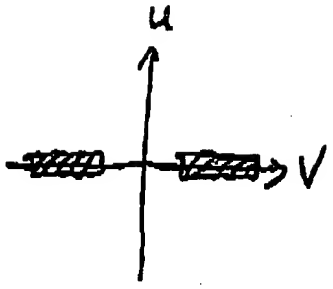


Figure 1

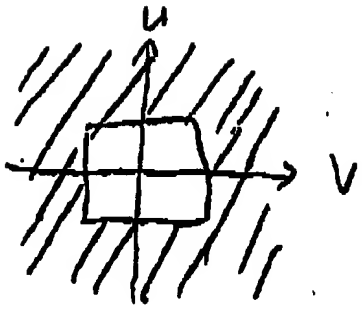


Figure 2

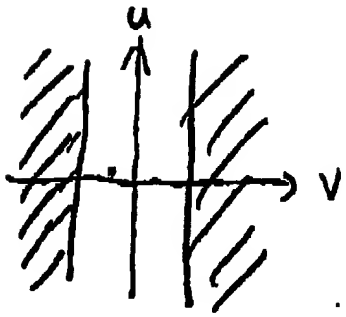


Figure 3